

What is claimed is:

1. A receiver that receives transmission signals transmitted in a communication system using plural frequency channels, comprising:
 - a phase locked loop (PLL) being formed of differential information output means for frequency dividing an input signal in a predetermined frequency division ratio to obtain a frequency-divided signal and for outputting differential information between said frequency-divided signal and a clock pulse, filter means for outputting a differential signal voltage corresponding to said differential information, and a voltage-controlled oscillator for controlling the frequency of an output signal according to said differential signal voltage;
 - receiver means for receiving said transmission signal as a local oscillation frequency the frequency of an output signal output from said PLL;
 - estimation means for estimating a receiving channel corresponding to the transmission channel of said transmission signal; and
 - control means for controllably switching the frequency of said output signal from a receiving channel at one terminal to a receiving channel at other terminal when the frequency of an output signal from said PLL is set to the frequency of a receiving channel corresponding to the transmission channel of said transmission signal;
 - wherein said estimation means estimates a receiving channel corresponding to a transmission channel for said transmission signal based on the received signal received by said receiver means, in the period during which said PLL changes from a receiving channel at one terminal to a receiving channel at the other terminal.
2. A receiver defined in Claim 1, wherein said communication system comprises a frequency hopping system for spread spectrum communication.
3. A receiver defined in Claim 1, wherein said control means controllably switches several times the frequency of an output signal output

from said PLL, from said receiving channel at one terminal to said receiving channel at the other terminal.

Sub R97
4. A receiver defined in Claim 1, wherein said estimation means comprises:

a signal strength measuring circuit for measuring the signal strength of said received signal;

an estimation circuit for estimating the signal strength measured in said signal strength measuring circuit and a receiving channel corresponding to the transmission channel of said transmission signal based on a hopping pattern in said frequency hopping system.

5. A receiver defined in Claim 4, wherein said estimation means comprises:

a modulation-system discriminator for discriminating the modulation system of said received signal; and

an estimation circuit for estimating the discrimination result by said modulation-system discriminator and a receiving channel corresponding to the transmission channel of said transmission signal based on a hopping pattern in said frequency hopping system.

6. A receiver defined in Claim 4, wherein said estimation means comprises:

a signal strength measuring circuit for measuring the signal strength of said received signal;

a modulation-system discriminator for discriminating the modulation system of said received signal; and

an estimation circuit for estimating a signal strength measured by said signal strength measuring circuit and a receiving channel corresponding to the transmission channel of said transmission signal based on a hopping pattern in said frequency hopping system.

7. A receiver that receives transmission signals transmitted in a

communication system using plural frequency channels, comprising:

a phase locked loop (PLL) being formed of differential information output means for frequency dividing an input signal in a predetermined frequency division ratio to obtain a frequency-divided signal and for outputting differential information between said frequency-divided signal and a clock pulse, a first filter to which a first time constant is set, a second filter to which a second time constant slower than said first time constant is set, filter means for outputting a differential signal voltage corresponding to said differential information, and a voltage-controlled oscillator for controlling the frequency of said output signal according to said differential signal voltage;

time-constant switching means for switching the time constant of said filter means;

receiver means for receiving said transmission signal having as a local oscillation frequency the frequency of an output signal output from said PLL;

estimation means for estimating a receiving channel corresponding to the transmission channel of said transmission signal; and

control means for performing switching control such that said time-constant switching means switches said filter means from said first filter to said second filter when the frequency of an output signal from said PLL is set to the frequency of a receiving channel corresponding to the transmission channel of said transmission signal and for controllably switching the frequency of an output signal output from said PLL from a receiving channel at one terminal to a receiving channel at the other terminal;

wherein said estimation means estimates a receiving channel corresponding to the transmission channel for said transmission signal based on the received signal received by said receiver means, in the period during which said second filter changes at low rate an output signal output from said PLL from a receiving channel at one terminal to a receiving channel at

the other terminal.

8. A receiver defined in Claim 7, wherein said communication system comprises a frequency hopping system for spread spectrum communication.

9. A receiver defined in ~~Claim 7~~, wherein said control means controllably switches several times the frequency of an output signal output from said PLL, from said receiving channel at one terminal to said receiving channel at the other terminal.

10. A receiver defined in Claim 7, wherein said estimation means comprises:

a signal strength measuring circuit for measuring the signal strength of said received signal;

an estimation circuit for estimating the signal strength measured in said signal strength measuring circuit and a receiving channel corresponding to the transmission channel of said transmission signal based on a hopping pattern in said frequency hopping system.

11. A receiver defined in Claim 7, wherein said estimation means comprises:

a modulation-system discriminator for discriminating the modulation system of said received signal; and

an estimation circuit for estimating the discrimination result by said modulation-system discriminator and a receiving channel corresponding to the transmission channel of said transmission signal based on a hopping pattern in said frequency hopping system.

12. A receiver defined in Claim 7, wherein said estimation means comprises:

a signal strength measuring circuit for measuring the signal strength of said received signal;

a modulation-system discriminator for discriminating the modulation system of said received signal; and

an estimation circuit for estimating a signal strength measured by said signal strength measuring circuit, a discrimination result of said modulation-system discriminator, and a receiving channel corresponding to the transmission channel of said transmission signal based on a hopping pattern in said frequency hopping system.

13. A received channel estimation method for a receiver, said method estimating a receiving channel corresponding to a transmission channel for a transmission signal transmitted in a communication system using plural frequency channels, comprising the steps of:

controllably switching the frequency of said output signal from a received channel on one terminal to a received channel on other terminal when the frequency of an output signal from said PLL is set to a receiving channel corresponding to the transmission channel of said transmission signal; and

estimating a receiving channel corresponding to the transmission channel based on the received signal received during said switching period.

14. A received channel estimation method for a receiver, said method estimating a receiving channel corresponding to a transmission channel for a transmission signal transmitted in a communication system using plural frequency channels, comprising the steps of:

switching the time constant of a filter in said PLL from a first time constant to a second time constant when the frequency of an output signal from said PLL is set to a receiving channel corresponding to the transmission channel of said transmission signal;

switching at a low rate the frequency of an output signal from said PLL from a receiving channel at one terminal to a receiving channel at the other terminal; and

estimating a receiving channel corresponding to the transmission channel based on the received signal received during said switching period.

Sub A97

15. A receiver that receives transmission signals transmitted in a communication system using plural frequency channels, comprising:

a plurality of receiving antennas for receiving said transmission signals;

a switching circuit for selectively switching outputs from said plurality of receiving antennas in a time-division mode to output received signals;

a phase locked loop (PLL) for outputting frequency-controlled output signals;

receiver means for receiving said received signal from said switching circuit using as a local oscillation signal said output signal output from said PLL;

estimation means for estimating a receiving channel corresponding to the transmission channel of said transmission signal; and

control means for controllably switching the frequency of said output signal from said PLL, from a receiving channel at one terminal to a receiving channel at other terminal when the frequency of an output signal from said PLL is set to a local oscillation frequency according to a receiving channel corresponding to the transmission channel for said transmission signal;

wherein said estimation means includes signal strength measuring circuit for measuring the signal strength of said received signal every unit period during which each of outputs of said received antennas is selected and then synthesizing said signal strengths over said unit selection period;

said estimation means estimating a receiving channel corresponding to the transmission channel for said transmission signal based on a synthesized signal strength in the period during which the frequency of said output signal from said PLL is changed to a local oscillation frequency corresponding to a receiving channel at one terminal and a receiving channel at the other terminal.

16. A receiver that receives transmission signals transmitted in a

communication system using plural frequency channels, comprising:

a plurality of receiving antennas for receiving said received signals;

a switching circuit for selectively switching outputs from said plurality of receiving antennas in a time-division mode to output a received signal;

a phase locked loop (PLL) for outputting frequency-controlled output signals, said PLL including a loop filter;

receiver means for receiving said received signal from said switching circuit, using as a local oscillation signal said output signal output from said PLL;

estimation means for estimating a receiving channel corresponding to the transmission channel of said transmission signal; and

control means for switching the time constant of said loop filter when the frequency of an output signal from said PLL is set to the local oscillation frequency according to a receiving channel corresponding to the transmission channel of said transmission signal and controllably switching the frequency of said output signal from said PLL, from a receiving channel at one terminal to a receiving channel at other terminal;

wherein said estimation means includes signal strength measuring means for measuring the signal strength of said received signal every unit selection period during which the output of each of said receiving antennas is selected, and synthesizing said signal strengths over said unit selection period, said estimation means estimating a receiving channel corresponding to the transmission channel for said transmission signal based on the signal strength synthesized in the period during which said filter changes the frequency of said output signal from said PLL, to a local oscillation frequency corresponding to a receiving channel at one terminal and a receiving channel at the other terminal.

17. A receiver defined in Claim 15 or 16, wherein said communication system comprises a frequency hopping system for spread spectrum

communication.

18. A receiver defined in Claim 17, wherein said estimation circuit estimates a receiving channel corresponding to the transmission channel for said transmission channel based on said synthesized signal strength and a hopping pattern in said frequency hopping system.